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VITALITY OF THE SEEDS OF *PINUS CONTORTA*.—How long pine seeds retain their vitality when inclosed in the serotinous cones which sometimes occur on certain species, has probably never been very carefully noted. In 1874, Dr. Engelmann collected in Colorado a branch of *Pinus contorta*, to which were still persisting the closed cones which had ripened in 1873-72-71-70-69-68-66-65. In the spring of 1879, four years and a half after the branch had been taken from the tree, these cones were sent to the Harvard Arboretum that the vitality of the seed might be tested.

The following is the result:

All the seeds yielded by the cones were planted on the 27th of May, 1879, those of each year in a separate pot. They all received the same treatment. The final examination was made on the 13th December, 1879.

1865—18 seeds from 3 cones were planted. None germinated.

1866—No seed was obtained from the single cone of this year.

1867—No cones received for this year.

1868—24 seeds from 2 cones were planted. None germinated.

1869—24 “ “ 2 “ “ “ 4 “

1870—45 “ “ 2 “ “ “ 4 “

1871—6 “ “ 1 “ “ “ 2 “

1872—19 “ “ 2 “ “ “ 5 “

1873—9 “ “ 1 “ “ “ None “

This experiment is unsatisfactory owing to the want of seeds of 1866 and 1867, and because those of 1873 had probably never been fully developed. It is only interesting in view of the fact that it may possibly lead to this subject being more fully investigated. It is particularly desirable to obtain and test the seeds from old serotinous cones of such species as *Pinus serotina*, the Florida *P. inops* var. *clausa*, *P. tuberculata*, *P. muricata*, and *P. insignis*. There are always facilities for making such experiments at the Arboretum when sufficient material can be obtained.—C. S. SARGENT, Brookline, Mass.

VEGETATION UNDER THE ELECTRIC LIGHT.—In the number of *Nature* for March 11, appears the extract of an important paper by Dr. C. W. Siemens presented to the Royal Society on March 4. The question as to whether or not the dissociation of carbon dioxide and water in the leaf cells of plants could be made to take place under artificial light as it does under sunlight, caused Dr. Siemens to undertake the experiments described. The apparatus consisted of a vertical Siemens' dynamo-machine making 1000 revolutions per minute, and driven by an Otto gas engine of 3 horse-power; furnished with a lamp with carbon electrodes of 12 and 10 mm. diameter; producing a light equal to 1,400 candles. In the first series of experiments the lamp, with metallic reflector, was placed in the open air, two meters above the glass of a sunk melon house. Pots of quick-growing plants, such as mustard, carrots, beans, cucumbers, etc., were so arranged that the light would fall on them at approximately the same angle as that of the sun, provision being made for their protection

from either when desired. The pots were divided into four groups:

1. One pot of each kept entirely in the dark.
2. One was exposed to the electric light only.
3. One was exposed to daylight only
4. One was exposed successively to day and electric light.

The electric light was supplied from 5 to 11, P. M., the plants being left in darkness the remainder of the night. The result shows what was to be expected in the first group. The second had pale, green leaves, but with sufficient vigor to survive. The third showed the usual healthy color, while the last were unmistakably superior to all the rest, both in the deeper green of the leaves and greater vigor. In these experiments the time of supplying the electric light was only about half the time of daylight. In the next series the plants were divided into three classes:

1. Exposed to daylight alone.
2. Exposed to electric light 11 hours, and kept dark in day.
3. Exposed to 11 hours of electric light and 11 hours daylight.

(1) had the usual healthy appearance at the end of four days and nights; (2) were usually lighter in color but in one case darker; (3) again were plainly superior, more so than before.

The lamp was next put into a palm-house 8.62 m. by 14.42 m. by 4.42 m. All the plants therein flourished, but those nearest the light most. No harmful effects from lack of ventilation of the compounds generated by the burning. The conclusions deduced from these experiments are as follows:

1. That the electric light is efficacious in producing chlorophyll and promoting growth.

2. That an electric center of light equal to 1,400 candles, placed at a distance of 2 meters from growing plants appeared to be equal in effect to average daylight at this season of the year.

3. That the carbonic acid and nitrogenous compounds generated in diminutive quantities in the electric arc, produce no sensible deleterious effects upon plants inclosed in the same space.

4. That plants do not require a period of rest during the 24 hours of the day, but make increased and vigorous progress if subjected during daytime to sunlight and during the night to the electric light.

5. That the radiation of heat from powerful electric arcs can be made available to counteract the effect of night frosts.

6. That while under the influence of electric light plants can bear increased stove-heat without collapsing, which is favorable to forcing by the electric light.

7. That the expense of electro-horticulture depends on the cost of mechanical energy, but can be made moderate where natural forces can be made available.

Dr. Siemens' experiments still continue and we shall await the results of longer trials with considerable curiosity. His deductions confirm those of Dr. Schuebeler on the effect of uninterrupted sunlight of the Arctic regions.—C. R. B.